VEER NARMAD SOUTH GUJARAT UNIVERSITY

Syllabus for B. Sc. Semester V

Subject: Physics (PHY-5006)

Paper – VI

[2 credit course- 2 hours per week]

Unit – I **Mechanics** **Duration: 15 hrs**

Waves and Oscillations:

The free vibrations of physical systems

3. The decay of free vibrations, the effects of very large damping

Forced vibrations and resonance

4. Undamped oscillator with harmonic forcing, complex exponential method for forced oscillation, forced oscillation with damping, effect of varying the resistive term, transient phenomena

Text Book: Vibrations and waves by A P French, CBS publishers & distributors pvt ltd. (The M. I. T. introductory Physics series)

Mechanics:

Conservation principles (1.2), Mechanics of a particle (1.3), Mechanics of a system of particles (1.4), Constraint motion, constraints and degrees of freedom (1.5), Generalized Coordinates (1.6), generalized notations (1.7), Limitations of Newton's laws (1.8)

Deduction of Lagrange's equation by differential method-D' Alembert's principle (2.5), Deduction of Hamilton's principle from D' Alembert's principle (2.7.1), Deduction of Newton's second law of motion from Hamilton's principle (2.7.2)

Text Book: Classical Mechanics by Gupta, Kumar and Sharma,
Pragati Prakashan (26^{th} edition 2012)

Unit – II **Mathematical methods** **Duration: 15 hrs**

Scalar and vector fields (1.15), important vector relationships (1.19), Orthogonal Curvilinear Coordinates (1.20), starting from Cartesian coordinates to find the values of $d\ i\ \vec{v}$ and $\nabla^2 S$ in terms of circular coordinates and spherical coordinates (1.21), the vector integration, (a) Line integration, (b) surface integration, (c) Volume integration (1.22), Gauss divergence theorem (1.23), Stoke's theorem (1.24), Green's theorem (1.25), Gauss's formula of electrostatics from Gauss' divergence theorem (1.26), Green's theorem in plane (1.27)

Text book: Mathematical Physics by Rajput, Pragati prakashan (17^{th} edition)

Note: illustrative problems on all the relevant topics should be covered.

REFRENCE BOOKS:

1. University physics by Sears & Zimansky, Pearson
2. University physics by Freedman, Pearson
3. Berkeley physics course volume I, Tata McGraw-Hill Education
4. Classical Mechanics by J. C. Upadhyay, Himalaya publishing house
5. Classical Mechanics by Takwale and Puranik, Tata McGraw-Hill Education
6. Mathematical Methods in Physical Sciences by M Boas, Wiley eastern